

San Joaquin River Organophosphorous (OP) Pesticides TMDL Workshop

Current Activities of the California Regional Water
Quality Control Board, Central Valley Region
17 & 18 January 2001



Leslie Grober
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Workshop Agenda

- Overview of Central Valley Regional Water Quality Control Board TMDLs and TMDL Timelines
- Organo-phosphorus Pesticides TMDLs in the Central Valley
- Status of San Joaquin River OP Pesticide TMDL

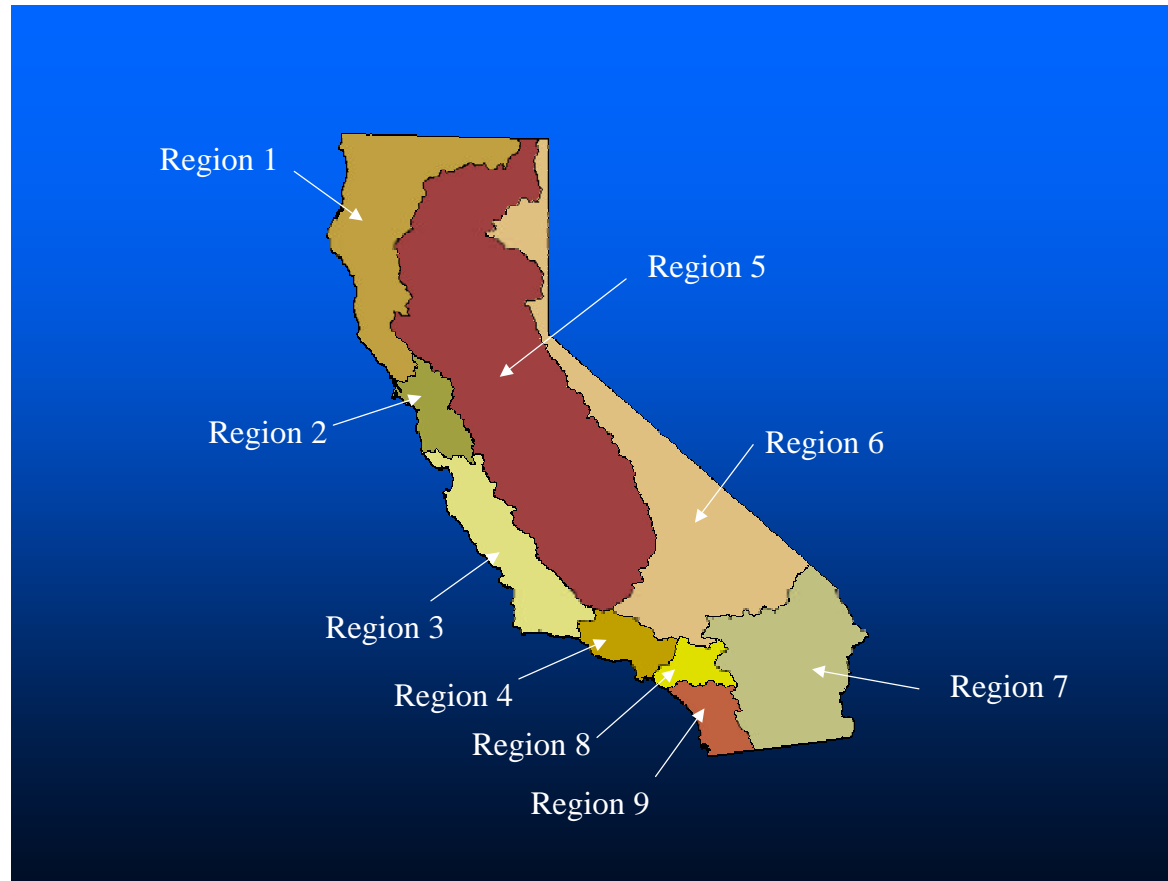
Overview of Central Valley Regional Water Quality Control Board TMDLs



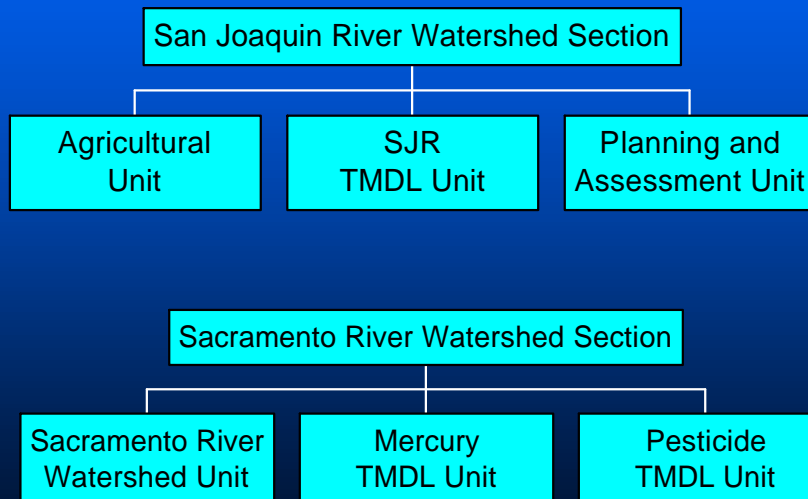
Leslie Grober

Overview Agenda

- Who are we?
- What is a TMDL? (and why do one?)
- Why are we here?
 - What is the responsibility of the Regional Board?
 - What is the regulatory authority of Regional Board?
- What are the current activities of the Regional Board with regard to OP pesticides (and other pollutants)?
- How are TMDLs being addressed?



Regional Board Watershed Section Organization



What Is a TMDL and Why Do One?

- TMDL = Total Maximum Daily Load
- TMDLs are required under section 303(d) of the Federal Clean Water Act
 - TMDLs must be developed for pollutants and waterbodies that have been identified on 303(d) list of impaired waterbodies

What Is a TMDL?

- A total maximum daily load (TMDL) is the amount of a specific pollutant that a waterbody can receive and still maintain a water quality standard
- TMDLs allocate pollutant loads to point and nonpoint sources...

What Is a TMDL?

- $\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS} + \text{background}$

WLA: waste load allocation for point sources

LA: load allocations for nonpoint sources

MOS: margin of safety

Components of TMDLs

- TMDL Description (Problem Statement)
- Numeric Targets (will often be new water quality objectives)
- Source Analysis
- Allocations
- Linkage Analysis (relationship between sources, allocations, and targets)
- TMDL Report

Why are we here?

TMDLs and Basin Plan Amendments

- TMDLs are required under section 303(d) of the Federal Clean Water Act
 - TMDLs must be developed for pollutants and waterbodies that have been identified on 303(d) list of impaired waterbodies
- Basin Plans are required under section 13240 of the California Water Code
 - Basin Plans are periodically amended to include new state policies and programs, to be consistent with other regional and state plans and to add new water quality objectives or implementation plans

Components of Basin Plan Amendments

- Beneficial Use Listing
- Establish Water Quality Objectives
- Develop Implementation Plan
 - Perform California Environmental Quality Act (CEQA) Analysis
 - Identify Responsible Parties
 - Conduct Economic Analysis
 - Conduct Formal Public Workshops and Hearings
 - Compile Administrative Record
 - Coordinate with State Water Resources Control Board, Office of Administrative Law, and U.S. EPA
 - Obtain Formal Peer Review of Technical Aspects of the Basin Plan Amendment

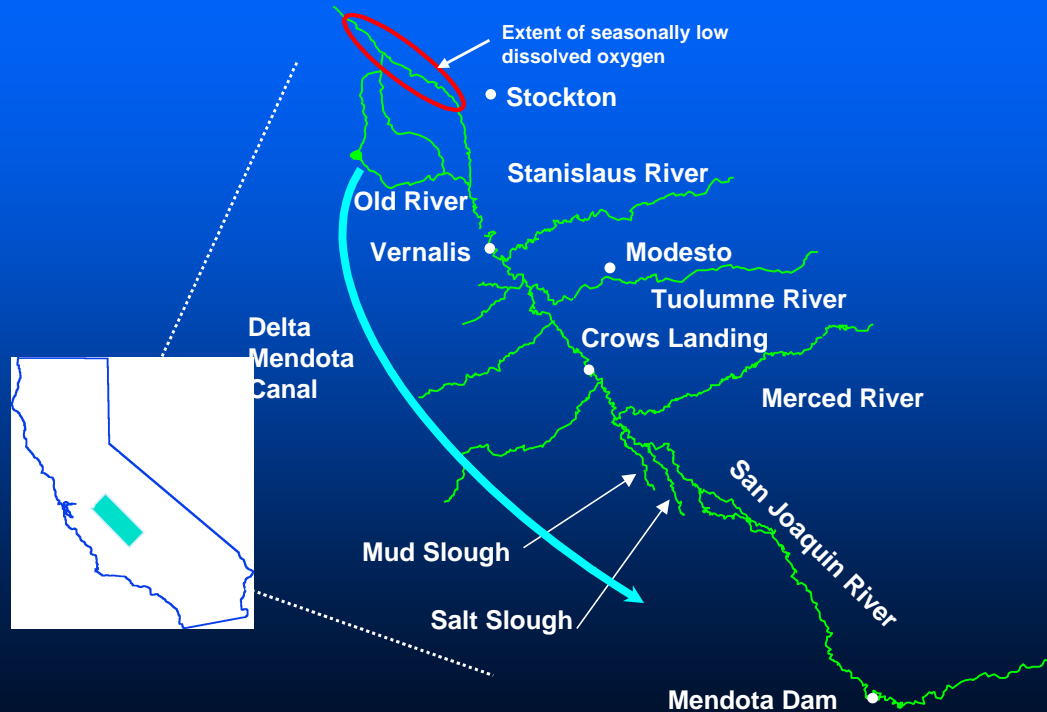
Implementation Tools

- Wide range of actions possible:
 - Voluntary actions
 - Regulatory-based encouragement
 - » watershed approach
 - » real time management
 - Regulatory Actions
 - » Waste Discharge Requirements
 - » Prohibition of Discharge

Common Elements of Basin Plan Amendments and TMDLs

Element	Basin Plan Amendment	TMDL
Impetus	Beneficial use listing	303(d) listing & problem statement
Water quality protection	Water quality objective	Numeric targets
Methods	Source Analysis Models Public Outreach	Source Analysis Models Public Outreach
Product	Implementation Plan	Load Allocations

Lower San Joaquin River Basin



TMDL Timeline

Current Activities

Watershed	June 2001	June 2002	June 2003
San Joaquin River	Selenium Salt & boron	Diazinon & chlorpyrifos	
Delta			Dissolved oxygen Diazinon & chlorpyrifos Mercury
Sacramento River	Copper, zinc, & cadmium	Diazinon	
Clear Lake	Mercury		
Cache Creek		Mercury	



Topics to be Covered

- Central Valley waterbodies impacted by OP Pesticides & TMDL Schedules
- Communication with Stakeholders
- Current Status – Sacramento River Watershed & Urban Creeks

Waterbodies Impaired by Diazinon & Chlorpyrifos in the Central Valley

Water Body	Pollutants	Size
San Joaquin River	Diazinon, Chlorpyrifos	130 mi
Merced River	Diazinon, Chlorpyrifos	60 mi.
Tuolumne River	Diazinon	32 mi
Stanislaus River	Diazinon	48 mi
Harding Drain (TID Lateral #5)	Diazinon, Chlorpyrifos	7 mi
Orestimba Creek	Diazinon, Chlorpyrifos	10 mi
Salt Slough	Diazinon, Chlorpyrifos	15 mi
Delta Waterways	Diazinon, Chlorpyrifos	480,000 acres
Mosher Slough	Diazinon, Chlorpyrifos	2 mi

Waterbodies Impaired by Diazinon & Chlorpyrifos in the Central Valley

Water Body	Pollutants	Size
Sacramento River	Diazinon	30 mi
Feather River	Diazinon	60 mi.
Arcade Creek	Diazinon, Chlorpyrifos	10 mi
Chicken Ranch Slough	Diazinon, Chlorpyrifos	5 mi
Elder Creek	Diazinon, Chlorpyrifos	10 mi
Elk Grove Creek	Diazinon	5 mi
Morrison Creek	Diazinon	20 mi
Natomas East Main Drain	Diazinon	5 mi
Sacramento Slough	Diazinon	1 mi
Strong Ranch Slough	Diazinon, Chlorpyrifos	5 mi

Current Status

Timeline for TMDL Reports (R)/ Basin Plan Amendments (B)

Waterbody	6/02	6/03	6/04
San Joaquin	R	B	
Sacramento & Feather	R	B	
Delta		R	B
Arcade Creek	R	B	
Urban Creeks		R	B

Communications with Stakeholders

- Stakeholder Groups Develop Information Needed for TMDL
 - Sacramento River Watershed Program
 - » Organo-phosphate Pesticide Focus Group
(<http://www.sacriver.org/subcommittees/op/>)

Communications with Stakeholders

- Regional Board staff Develop Information Needed for TMDL
 - Urban Pesticide Committee
 - Arcade Creek (just forming)
 - San Joaquin River OP Workshops
- Other TMDLs will use both approaches

Current Status

- Sacramento River Watershed Program
Organo-Phosphate Pesticide Focus Group
 - Developed Diazinon Numeric Target Paper
 - Conducted intensive sampling program in Winter 2000
 - Awarded 319(h) Grant to Evaluate Practices and Aquatic Life Impacts (Prune Board)
 - Strategy to be developed by April 2001

Current Status

■ Urban Pesticide Committee

- Serves as Forum for discussion of approaches to addressing OP runoff from Urban sources
- Includes Bay Area & Sacramento Storm Water Agency Interests
- Members of Committee have a number of projects to identify sources, alternatives and develop outreach programs

Current Status

- Arcade Creek Stakeholders
 - Had initial meeting with groups conducting monitoring
 - Included DPR, USGS, Cities of Sacramento, Citrus Heights, County of Sacramento, EPA

Current Status

- Storm Water Permits
 - Large cities (greater than 100,000 people) have Federal permits governing storm water runoff
 - Sacramento, Stockton, & Modesto permits will be renewed next year
 - Will likely need to address OP impacts on creeks within permit life (five years)



San Joaquin River Organophosphorous (OP) Pesticides TMDL

Current Activities of the California Regional Water
Quality Control Board, Central Valley Region

San Joaquin River TMDL Unit



Shakoora Azimi

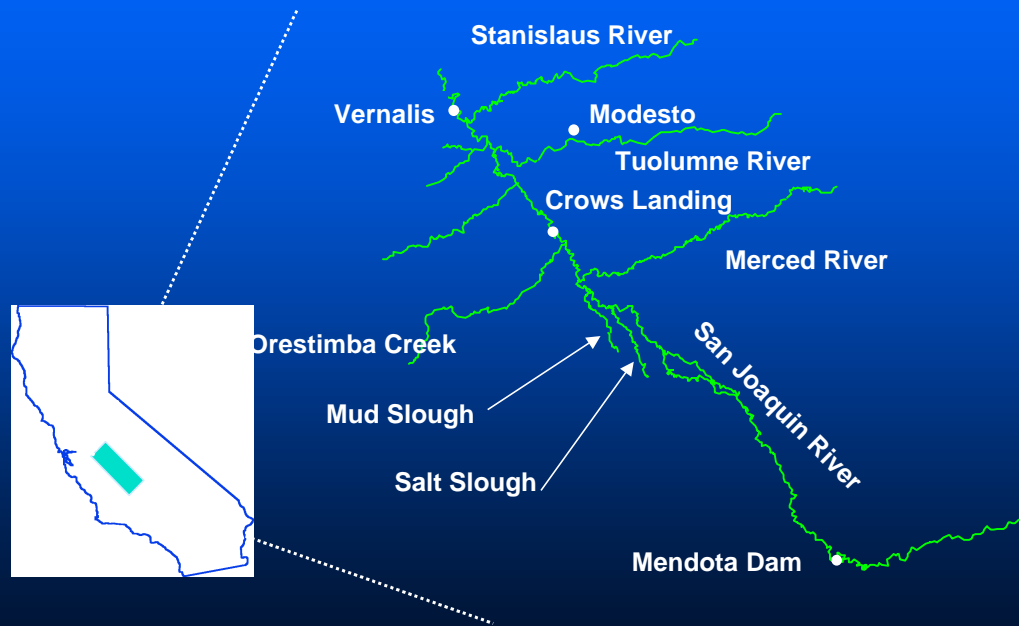
Topics Of OP Pesticides TMDL

- Background and History
- Project Area
- Component of TMDL
- Status of the OP Pesticides TMDL
- OP Pesticides TMDL Timelines
- Factors that can Affect Pesticides Fate and Transport
- Implementation Plan
- On-Going Monitoring
- Future Workshop Topics

Background

- OP Pesticides Concentrations in the San Joaquin River
- Monitoring has Confirmed the Presence of Chlorpyrifos and Diazinon
- San Joaquin River is Listed in Clean Water Act Section 303(d)
- TMDL for Chlorpyrifos and Diazinon
- Project Area

Project Area for OP Pesticides TMDL



Components of TMDL

- TMDL Description (Problem Statement)
- Numeric Target
- Source Analysis
- Load Allocation
- Linkage Analysis
- TMDL REPORT
- *Implementation Plan*
- *Ongoing Monitoring*

Problem Statement

- Background and History
- Applicable Standards
- Beneficial Uses
- Magnitude of the Impairment
- Reasons for Listing

Water Quality Target

- No Established Numeric Water Quality Objectives
- Numeric Target Needs to be Established
- U.S. EPA Criterion
- California Department of Fish and Game Criterion
- Basin Plan Narrative Water Quality Objectives

Water Quality Target (continued)

- BASIN PLAN NARRATIVE TOXICITY

*“ ALL WATERS SHALL BE MAINTAINED
FREE OF TOXIC SUBSTANCES IN
CONCENTRATIONS THAT PRODUCE
DETRIMENTAL PHYSIOLOGICAL
RESPONSES IN HUMAN, PLANT, ANIMAL
OR AQUATIC LIFE.”*

Target Analysis

- Alternative Targets
- Method of Deriving Criteria
- Summary of Results
- No Numeric Target is Established
- Diazinon and Chlorpyrifos Target Reports

Range of Numeric Targets

METHOD	CHLORPYRIFOS (ig/L)		DIAZINON (ig/L)	
	Acute	Chronic	Acute	Chronic
U.S. EPA Method as Used by U.S. EPA	0.08	0.041	0.09	NA
U.S. EPA Method as Used by DFG	0.02	0.014	0.08	0.05
Probalistic Ecological Risk Assessment (PERA)	NA	0.148 ^{b (2)(3)}	1.117 ^{a (1)}	3.71 ^{b (1)}
Mesocosm/Microcosm	NA/NA	NA/NA	8.4/NA	NA/9.1

a = 5th percentile

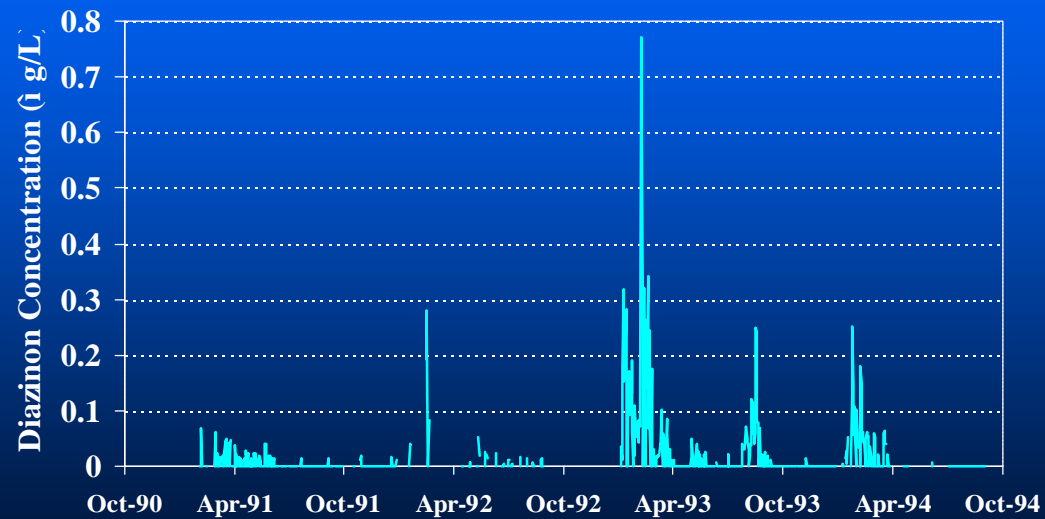
b = 10th percentile

(1) Novartis Crop Protection. An ecological risk assessment of diazinon in the Sacramento and San Joaquin river systems.

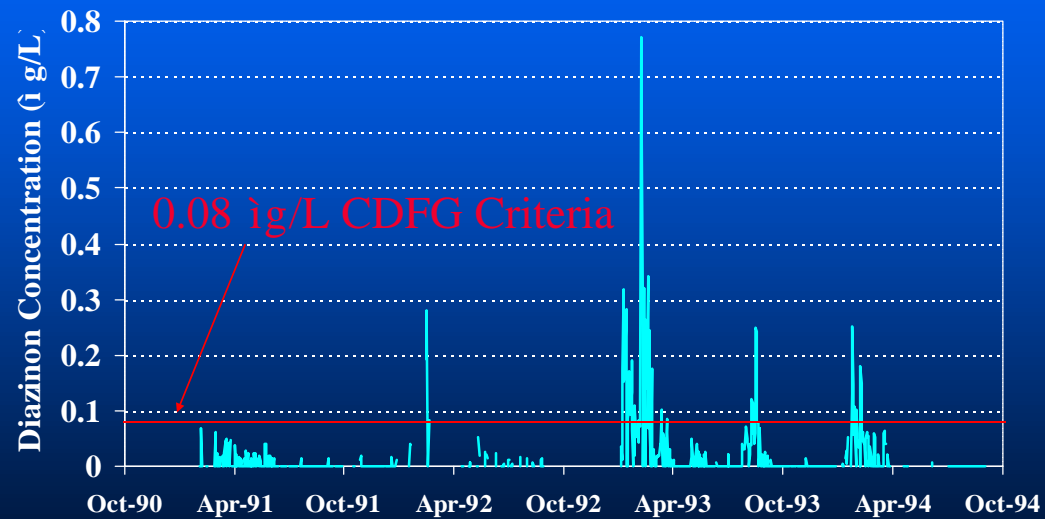
(2) Dow AgroSciences. A monitoring study to characterize chlorpyrifos concentration patterns and ecological risk in an agricultural dominated tributary of the San Joaquin River, 1998.

(3) Dow AgroSciences. Ecological risk of chlorpyrifos in North America aquatic environments, 1999.

San Joaquin River Near Vernalis Daily Diazinon Concentration



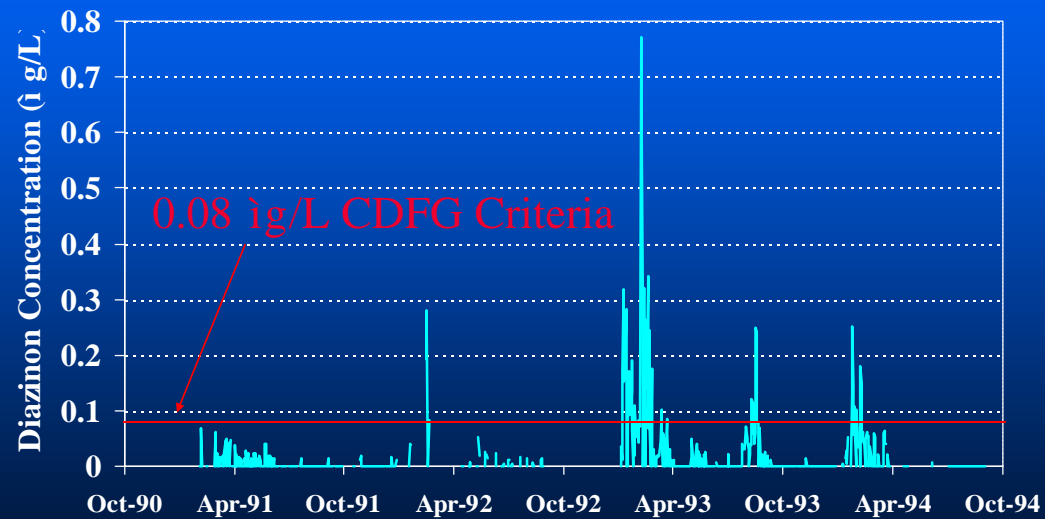
San Joaquin River Near Vernalis Daily Diazinon Concentration



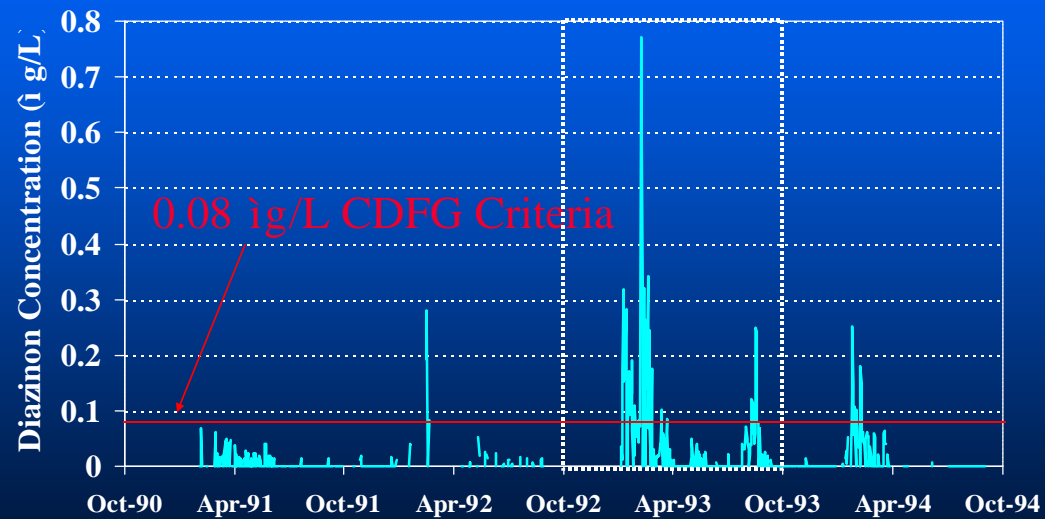
Sources Of Chlorpyrifos and Diazinon

- Storm Runoff After Dormant Spray
- Summer Irrigation Tail Water Runoff
- Urban Runoff
- Atmospheric
- Drift From Different Applications
- Improper Mixing and Loading Practices

San Joaquin River Near Vernalis Daily Diazinon Concentration



San Joaquin River Near Vernalis Daily Diazinon Concentration



San Joaquin River Near Vernalis Daily Diazinon Concentration



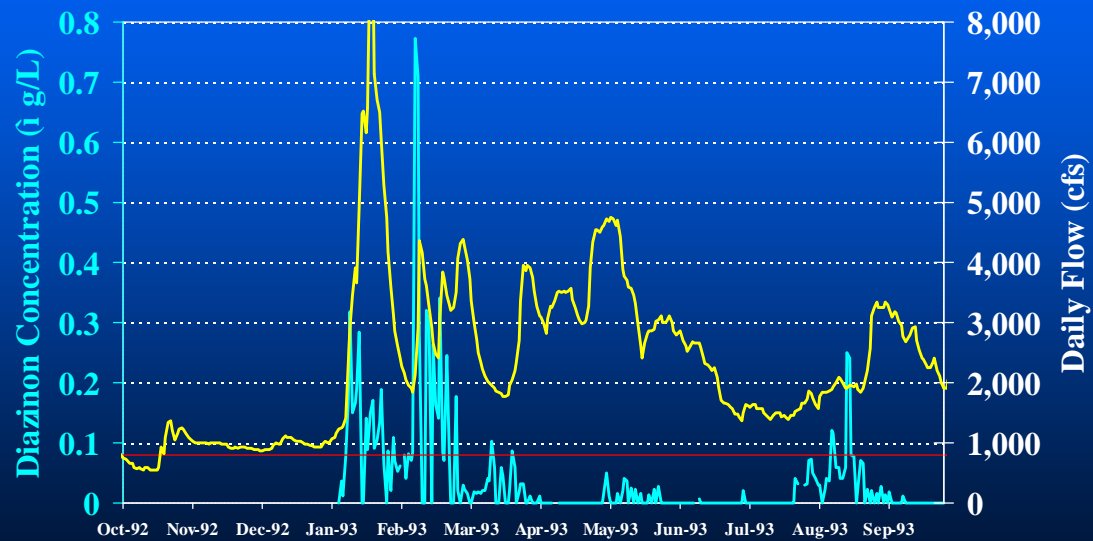
San Joaquin River Near Vernalis

Mean Daily Flow

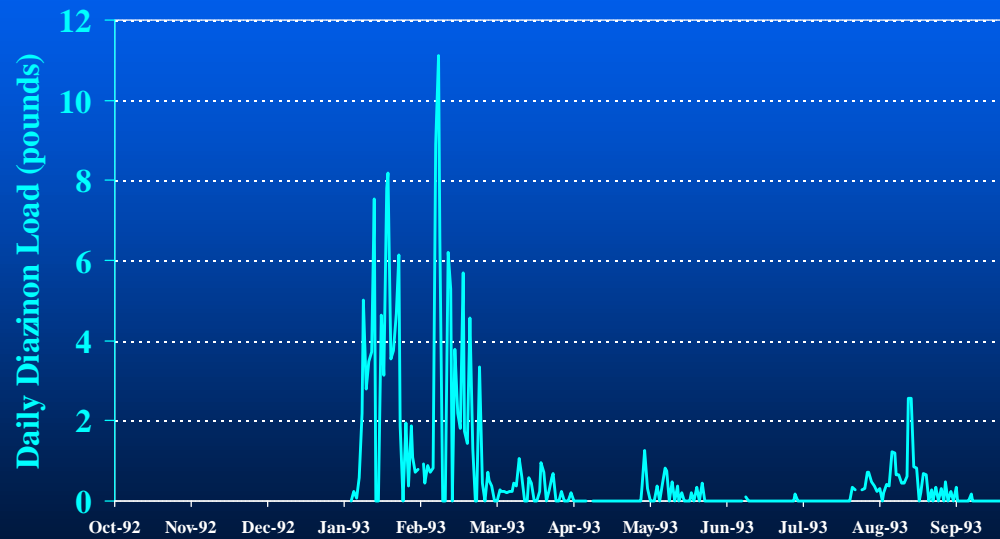


San Joaquin River Near Vernalis

Daily Diazinon Concentration

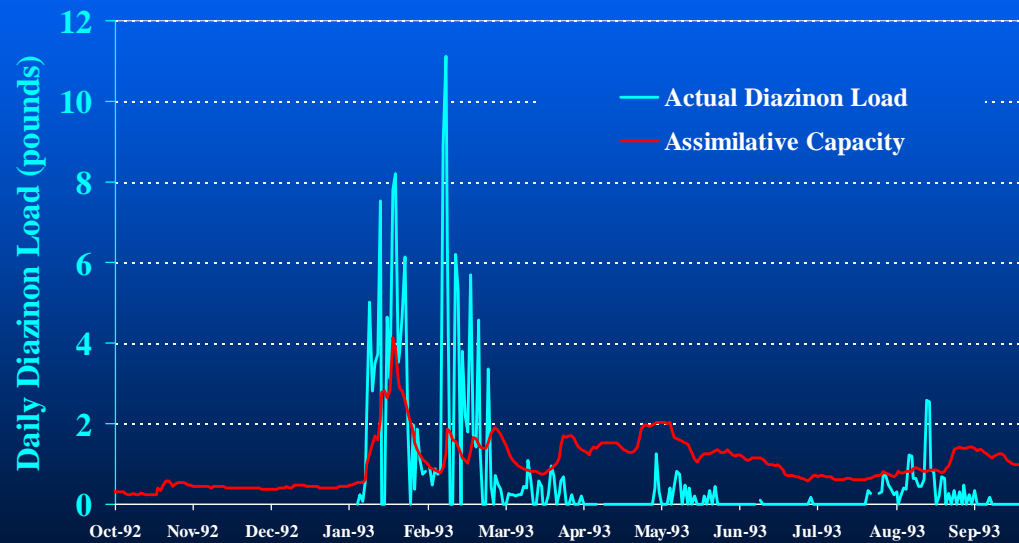


San Joaquin River Near Vernalis Daily Diazinon Load

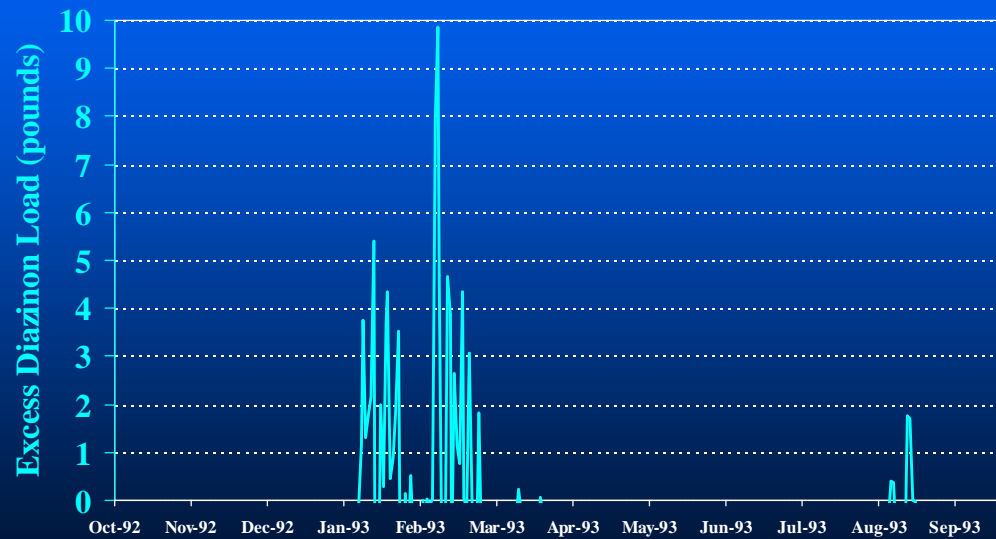


San Joaquin River Near Vernalis

Daily Diazinon Load

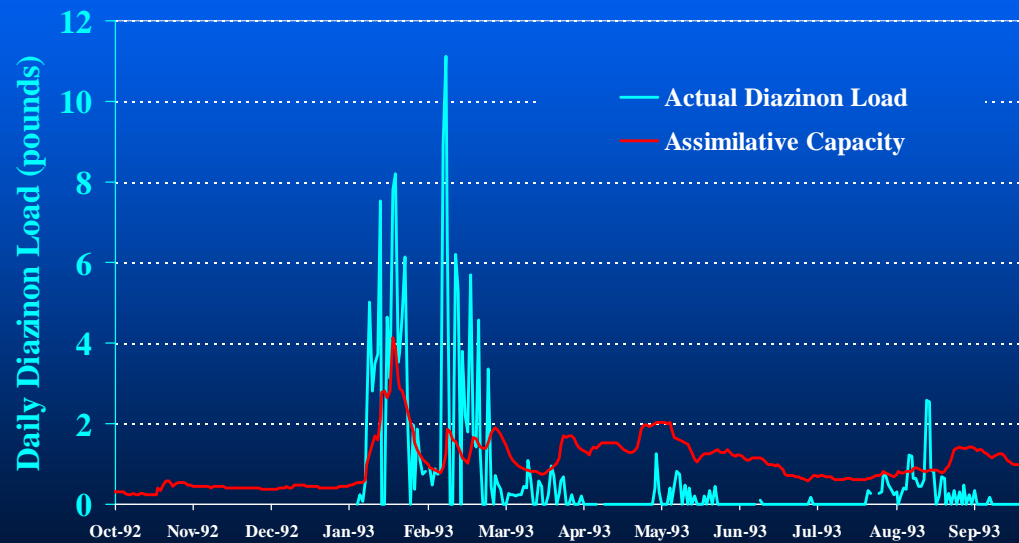


San Joaquin River Near Vernalis Daily Excess Diazinon Load

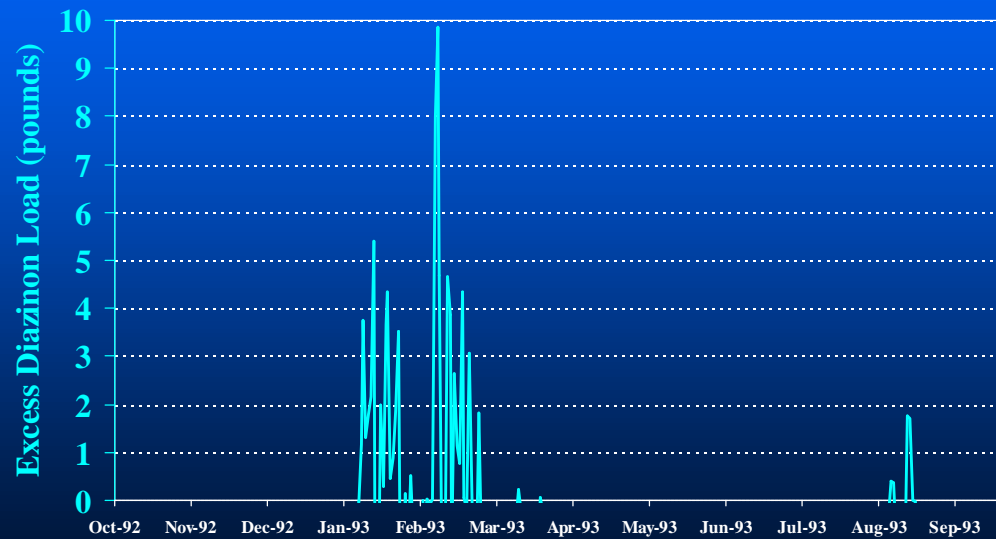


San Joaquin River Near Vernalis

Daily Diazinon Load



San Joaquin River Near Vernalis Daily Excess Diazinon Load



Source Analysis

Objective:

- Determine the quantity and location of the sources of OP Pesticides loading in the watershed

Approach:

- Divide the watershed into geographic sub-areas
- Use monitoring data and modeling to determine loading from sub-areas

TMDL Loading Capacity and Linkage Analysis

Objective:

- Determine the load reductions needed to achieve water quality targets.
- Establish relationship between pollutant sources and in-stream numeric targets

Load Allocation

Objective:

- Determine Assimilative Capacity
- Allocate loads among the various source categories within each of the sub-areas
- Use a Margin of Safety to account for uncertainties in the analyses

Linkage Analysis

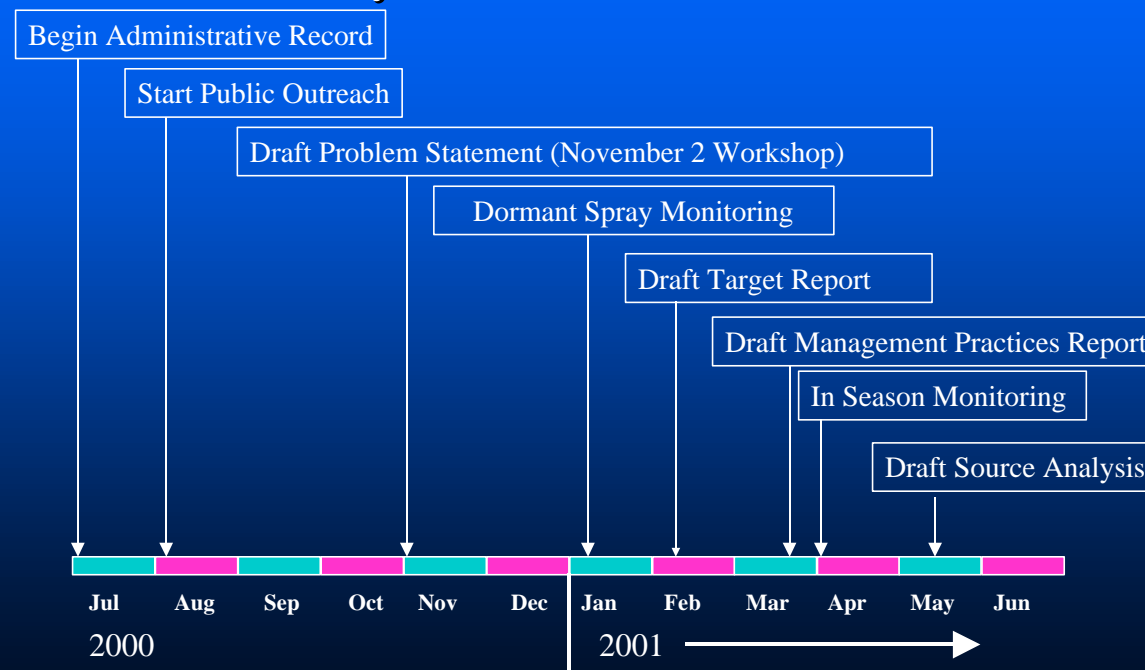
Objective:

- Must Demonstrate that Established Load Limit Will Result in Attainment of Water Quality Objectives (Target)

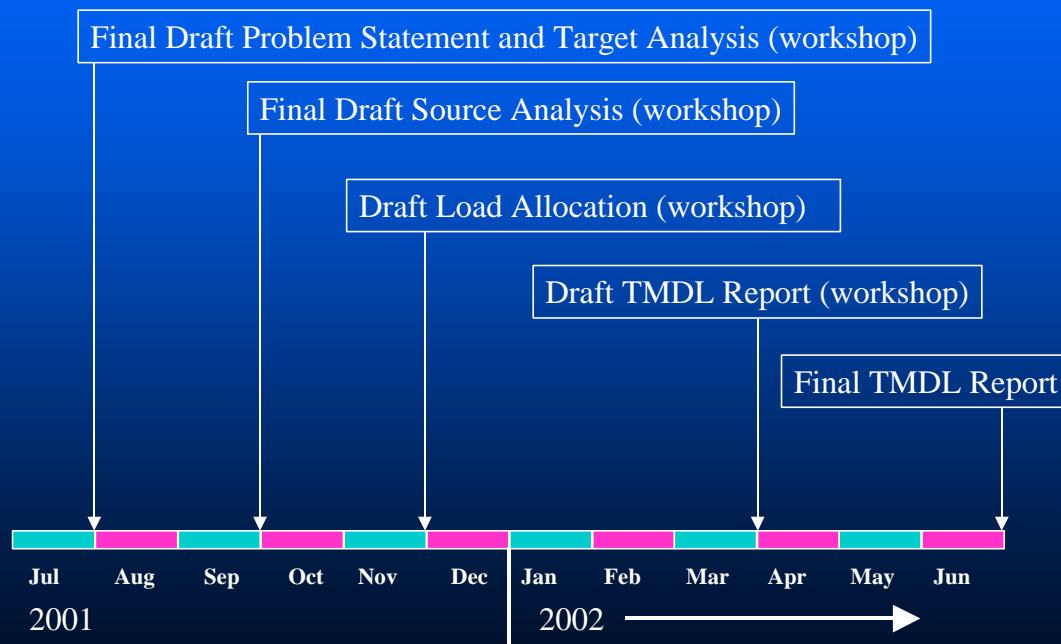
Components of TMDL

- TMDL Description (Problem Statement)
- Numeric Target
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- TMDL REPORT
- *Implementation Plan*
- *Ongoing Monitoring*

SJR OP Pesticide TMDL Timeline July 2000 to June 2001



SJR OP Pesticide TMDL Timeline July 2001 to June 2002



Components of TMDL

- TMDL Description (Problem Statement)
- Numeric Target
- Source Analysis
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- TMDL REPORT
- *Implementation Plan*
- *Ongoing Monitoring*

Factors That Can Affect Pesticide Fate & Transport

- Rainfall
- Application Method
- Cover Crops
- Soil Slope
- Soil Type

Implementation Plan

- Agricultural Sources
 - Dormant Spray Season
 - In-Season Irrigation Return Flows
- Urban

Implementation Tools

- Wide range of actions possible:
 - Voluntary actions
 - Regulatory-based encouragement
 - » watershed approach
 - » real time management
 - Regulatory Actions
 - » Waste Discharge Requirements
 - » Prohibition of Discharge

Implementation Plan

- Voluntary Efforts

- Management Practices

- Regulatory

- Department of Pesticide Regulation-- regulate pesticide with use restrictions, new labeling
 - Regional Board–
 - » Waste Discharge Requirements
 - » Prohibition of Discharge

On-Going Monitoring

- Dormant Spray Sampling
 - Agricultural Area
 - Urban Area
 - Rainfall Monitoring
- In-Season Monitoring
- Efficacy of Management Practices
 - Dormant
 - In-Season



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Citizen Monitoring - Who Participates?

- » **Local Agencies**
- » **Non-Profit Groups**
- » **Landowners**
- » **K-12 Students**
- » **College Students**
- » **Interested Individuals**



Clean Water Team Goal: Encourage objectivity and scientific procedures through a consistent training program.

- Awareness of Error
- Attitude & Responsibility
- Ethics
- Safety and Access



Clean Water Team Services

- Technical Assistance
- Education
- Training
- Data Management



Levels of Citizen Monitoring

- Education/Stewardship
- Visual Assessments
- Sampling
- Sampling and Analysis
- Bioassessment



Successful Sampling Efforts

- Southern California Beach Pathogens, 1998
- Sacramento Urban Creeks and Atmospheric Deposition for OP Pesticides, 1995
- El Dorado County Streams OP Pesticides and Visual Assessments, Fall 2000

Future OP Pesticide Workshop Topics

- Draft Targets
- Draft Source Analysis
- Management Practices
- Load Allocations
- Modeling & Linkage Analysis

Conclusion

- OP Pesticides Contribute to Water Quality Problem in SJR
- OP Pesticide TMDL is a High Priority
- Stakeholder Input most needed
 - To identify and evaluate efficacy of management practices
 - To help develop implementation plan
 - Review staff reports

Staff Contacts

Staff	Topic	Phone	e-mail
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